The impact of outdoor learning experiences on attainment and behaviour

The impact of outdoor learning experiences on attainment and behaviour in schools: A brief review of literature

November 2012

Prepared for the Forestry Commission Scotland

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Please reference as:

Christie, B. & Higgins, P. (2012). The impact of outdoor learning experiences on attainment and behaviour: a brief review of literature. Forestry Commission Scotland/University of Edinburgh. Forestry Commission Report 11/2012

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Executive Summary

1.1 This review examines literature relating to practices in outdoor learning that may lead to changes in attainment and behaviour in schools. It is premised on the belief that education is not solely an indoor activity; and that wherever possible teaching should take place where it is best for students to learn whether that be indoors or outdoors (Beames, Higgins and Nicol, 2011). It has been conducted in respect of current Scottish policy development and government interest which is increasingly focused towards the development of confidence and competence amongst pre-service and practicing teachers in managing education for sustainable development and outdoor learning.

1.2 Whilst in Scotland there is governmental interest in outdoor learning, as a research it is relatively 'young' in the UK and internationally. Specifically, with regard to the focus of the present review there are limited studies available concerning:

a) the impact of outdoor learning on general behaviour
b) behaviour in terms of motivation, attitude and general classroom conduct
c) the impact of environmental education and outdoor learning on the development of pro-environmental behaviours.

These aspects of outdoor learning are not straightforward to research and therefore it is timely to address these points in a review.

1.3 The key finding from this review is that *whilst some research offers modest support for increased attainment in terms of specific subject areas such as maths, English, reading, science and social studies, greater evidence exists to suggest that outdoor learning affords an integration of curricular content and global skill development*. And, it is worth noting that *this falls in-line with the general philosophy and purpose of Scotland's Curriculum for Excellence (Scottish Government, 2007).*

1.4 Consequently, we suggest that there may be greater value in taking a general, rather than a subject-specific view of potential learning outcomes, due to the combination and variability of factors unique to a given experience (the individual, the educator, the place, the weather and so on) as well as the instinctive (yet, planned for) nature of learning out-of-doors. In most, if not all, of the research literature related to outdoor learning there is a degree of inherent uncertainty surrounding the generalisability of the findings ; we believe that this uncertainty reflects the complexity of the field.

1.5 There are however, three clear themes which emerge from the literature and appear core to positive outdoor learning experiences:

- First, authentic and informal outdoor contexts provide rich opportunities for the *development of peer and pupil-teacher relationships*; such connections are central to young peoples attachment and commitment to school and their academic career, more generally.
- Second, *'place' within the context of outdoor learning* is key to the development of an understanding, at a local level, of issues such as environment, history, culture and sustainability. Again, such knowledge and connection helps to foster positive attachments, commitment and respect for local areas, and school can be considered as a central part of the wider community.
- Third, *educators must be confident in their decision to teach out of doors.* They must respect the socially situated nature of learning out-of-doors, and the individual learner within that process which includes the past experiences that they may bring to the process. And in light of these nuances, they must maintain an appreciation for the unexpected, and unintended connections that individual learners can draw from one such experience. In other words, they must realise that what is 'learnt' is not necessarily what has been 'taught' which can make learning outcomes difficult to quantify.

1.6 Congruent with these themes is a general shift towards mixed method research within the field of outdoor learning, and education, more generally. This combined approach affords a more comprehensive research methodology which could be argued reflects the philosophical rationale underpinning outdoor learning; which, is premised upon global and holistic development of the whole person, the environment and the community and place in which they live rather than the specific development in one curricular area within one particular set of circumstances.

1.7 Given the three themes emerging from this review and the trend towards mixed-method research, we would suggest that future studies should not focus solely on an ultimate end goal of subject-specific attainment or 'best practice'. Rather, future efforts should respect the complexity of the practice and appreciate the individual nuances shared, created and developed within each outdoor learning experience. Similarly, practitioners should not seek a blueprint for outdoor learning instead they should continually seek to improve their own practice and the experience of those whom they teach and learn with, and from whilst being guided by their intended educational outcomes.

1.8 Additionally, in Scotland it would be most helpful if future research and evaluation should proceed in *parallel* with developments within the General Teaching Council, ministerial advisory groups and Teacher Education Institutions. Such strategic thinking would allow a comprehensive range of evidence informed, practical support to be developed *alongside* policy development. Currently, such a tactical approach is lacking.

1. Background

1.1 Project Brief

The review examines literature relating to practices in outdoor learning that may lead to changes in attainment and behaviour in schools. It is intended to inform further research and be of value in policy development. Additionally, this can inform developments related to curricular reform in Scottish education and support and foster understanding of process and outcomes relevant to recent growth in outdoor learning throughout the UK and internationally.

Often it is difficult to determine certain influences from others within the general school system; it is more so in the case of the present study because of the lack of existing research and evidence. Therefore, to consider the specific influence of outdoor learning we have drawn upon a wide range of evidence involving changes in behaviour and attainment amongst 'learners' (children and adults) within *informal educational settings* as well as more *formal, school-based settings*. Similarly, we have broadened the scope to include *environmental education* and *fieldwork* as a practice related to outdoor learning (see Section 1.2 for clear definitions). Where possible, we make such distinctions clear.

1.2 Definitions

1.2.1 Attainment and Behaviour

Within the context of this review, attainment refers to a young persons' global academic improvement and behaviour refers to general school behaviour covering aspects of motivation, engagement and attitude. We adhere to these global definitions throughout. However, if a study measures a specific aspect of attainment, or there is an emphasis on improvement in one specific behavioral domain, we will make this clear.

1.2.2. Outdoor Learning

The terms outdoor education and outdoor learning are often used interchangeably. We predominantly refer to 'outdoor learning' and adhere to Beames, Higgins and Nicol's (2011: 5) definition that outdoor learning 'covers all kinds of learning that might take place outside the classroom'.

1.2.3 Environmental Education

The Tbilisi Declaration[1] (Intergovernmental Conference on Environmental Education, 1977) states that the ultimate objective of environmental education is people's active involvement in working towards the resolution of environmental problems. However, recently Chawla and Cushing (2007) have extended this definition to include other objectives 'needed to achieve this goal; awareness, knowledge, concern for the environment, and skills' (p.437). Our definition blends both approaches. We believe that environmental

[1]The Tbilisi Declaration was developed in recognition of the important role of environmental education in the preservation and improvement of the world's environment, as well as in the sound and balanced development of the world's communities. see for further information http://www.gdrc.org/uem/ee/tbilisi.html

education (as a concept related to outdoor learning) involves learning about broader environmental issues (for example systems, concepts, conservation); an outcome of which may be greater knowledge and understanding of the significance of biodiversity, 'sustainable development' and lead subsequently to pro-environmental behaviours.

1.2.4 Formal and Informal learning

We recognise that teaching and learning can take place in a range of formal and informal settings and agree with Folkestad's (2006) generic definition of both terms. He describes a formal learning situation as one where:

> '… the activity is sequenced beforehand, that is, it is arranged and put into order by a 'teacher', who also leads and carries out the activity. However, that person does not necessarily have to be a teacher in the formal sense, but a person who takes on the task of organising and leading the learning activity' (Folkestad, 2006: 141)

He describes informal learning situation as one that is:

> '... not sequenced beforehand; the activity steers the way of working/playing/composing, and the process proceeds by the interaction of the participants in the activity' (Folkestad, 2006: 141)

These approaches are not mutually exclusive. Informal learning can flow from a formal learning activity and *vice versa*; and, sometimes, this blend can help to reinforce learning.

1.2.5 Fieldwork

Traditionally, fieldwork is regarded as a scientific endeavor, for example the British Ecological Society (BES) (2004) state that it 'allows students to connect abstract scientific ideas with 'hands on' experiences by allowing students to observe animals and plants in their natural habitat' further it promotes a 'deeper understanding of the investigatory approaches that underpin the whole of science' (p. 1). As outdoor learning covers all aspects of learning out of doors it will include fieldwork.

Further, outdoor learning and fieldwork share similar philosophical rationales. For example, a from a fieldwork perspective, BES state that fieldwork is necessary 'to address important environmental issues and have a significant impact on [young peoples'] ability to understand and manage changes to natural resources in the future' (BES, 2004: 1). From an outdoor learning perspective Beames *et al.* (2011) describe this as a clear educational imperative to help 'our planet and weakened communities be restored and cared for by an engaged, energetic young people' (p.xi). This agenda is also shared with sustainability education and environmental education more generally.[2]

1.3 Methodology

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[2] See Christie & Higgins (2012) for a brief review the impact of outdoor learning experiences on attitudes to sustainability.

We draw on a number of primary sources such as theses, dissertations, and journal articles, and secondary sources such as reference lists within policy documents. Full details are listed below.

Table 1 Literature search of primary sources

Database	Literature covered	Keywords/search parameters
Academic Search Elite	ERIC, Environment Complete, Academic Search Elite, GreenFILE, Humanities International Complete, SocINDEX, SPORTDiscus	outdoor, 'learning', 'attainment', 'exam', 'improvement/improving', 'school', 'behaviour', 'classroom',
ProQuest	Worldwide collection of theses and dissertations from 500 Universities.	'outdoor, 'learning', 'attainment', 'behaviour', all subjects
EThOS	UK electronic theses online service	outdoor, 'learning', 'attainment', 'exam', 'school', 'behaviour', ' classroom', all subjects

Much of the literature originates from America and Australia. The reasons for this are unclear. It may suggest a gap within the European literature and/or the need to translate and disseminate previous work undertaken in non-English speaking countries.

1.4 Limitations

We have excluded any non-English material due to time and resource constraints.

2. Does outdoor learning impact on attainment and behaviour in schools?

Examining the evidence and highlighting the key issues

In the UK and internationally there is a rapidly growing literature relating to the field of outdoor learning. More generally, there is no shortage of empirical evidence on environmental education. For example Rickinson (2001), when conducting an extensive critical review of evidence relating to 'learners and learning in environmental education between 1993 and 1999', managed to include over '100 pieces of different empirical research' (p.126); illustrating the volume of research being undertaken and published in that decade alone. Despite this increase, however, there remains a relative shortage of studies specifically related to the impact of outdoor learning on attainment and behaviour in schools (Clay, 1999; Williams, 2012). Those that do exist generally cover one, or a combination of, three areas:

- the *'programme'* - how the 'intervention' or outdoor experience has affected 'change'.
- the *'process'* - how the learning style or teaching approach has facilitated 'change'.
- the *'outcome'* - how the 'participants' have 'changed' or how overall aims of the 'intervention' have been met.

Methodology has also developed over the past twenty years. Quantitative studies involving typical quasi-experimental pre/post test measures were common until the 1990s, however, over the past decade mixed methodologies (combining both quantitative and qualitative approaches) have found favour. As such, recent studies have begun to consider individual experiences and expectations, and explored the notion that learners are not homogenous; they bring different experiences and have other influences that shape and affect their learning outcomes. This development reflects a general shift within educational research towards the sharing of practice, coupled with an acceptance of uncertainty rather than the quest for clear outcomes and generalisable standards (Bullough, 2012). With these issues in mind, this review does not provide definitive answers, rather it takes a broad overview of the available literature and highlights some of the key issues facing the field, more generally.

2.1 The process of learning outdoors; how does it work?

There are specific elements of outdoor learning that combine to make it *unique*, yet *complementary* to indoor learning. Recently, Beames *et al.* (2011) have provided three particularly convincing reasons for teaching in this way:

- the outdoors provides a means of bringing curricula alive,
- it helps students understand our environment and related issues of sustainable development
- it encourages physical activity

(Beames *et al.,* 2011: 1)

This report includes much of the evidence that supports these reasons alongside an examination of the processes that enable such learning to take place. In other words, we know *why* we learn out of doors (i.e. we have a rationale) but we want to consider *how* it works and *what* impact it may have on behaviour and attainment [3].

2.1.1 Getting hands-on

O'Brien *et al.* (2011) have determined that the multidimensional benefits of being outdoors are transferred through education by a combination of two processes: first a general exposure to nature, and second an active hands-on intensive/extensive contact with nature. In other words, being within greenspaces (or outdoors, more generally) is not enough, there needs to be a tangible, sensory, experiential element to the learning process. This is a major development because when taken alongside the arguments stated (above) by Beames *et al.* (2011) it provides growing evidence of the added value gained by being outdoors, rather than indoors.

However, it also remains clear that there are many aspects of *indoor learning* which lend themselves to experiential learning and teaching[4], for example art, music, elementary science, mathematics and history.

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[3] There is scope for another question here; 'how do we do it?' See Beames *et al'*s (2011) practical teacher-oriented guidelines for outdoor learning.

[4] For examples see Wurdinger (2005). Using experiential learning in the classroom.

Also, whilst some trips outside the classroom,for example, to attend a musical concert have a clear justification and benefits, they may well lack specific characteristics of 'outdoor learning', namely being 'hands-on' and involve direct contact with nature. In contrast, a trip to a local nature reserve (e.g. to collect plant samples) is active, involving a practical element with direct contact with nature. Therefore, it is the *combination* of being out-of-doors and the necessary experiential educative element of outdoor learning that offers synergistic benefits (O'Brien *et al.,* 2011).

White and Stockelin (1998) reinforce this by suggesting that children 'learn the rules and principles that make the world operate through physical interaction with materials and the natural environment' (p.5). More recently, Beames *at al.* (2011) have emphasised the importance of *first hand experience* as a necessary aspect of mainstream education if 'our young people are to reach their full capacity as humans and the planet is to flourish under their stewardship' (p.xi). Weibel (2011), building on such work and that of others such as Brody (2005), Ernst (2007), Lieberman and Hoody (1998), explores this further and suggests that it is the process of 'actually touching and seeing (manipulating) subject material in the natural environment [that] can have a positive impact on students' learning' (p.4). These points are echoed by Nundy (2001) who discusses the impact of the fieldwork setting and it's positive affect on long-term memory and subsequent recall He considered the impact of residential fieldwork on upper primary students and identified positive impacts on long-term memory which he attributed to the memorable nature of the natural setting as well as the residential experience[5]. He states that 'residential fieldwork is capable not only of generating positive cognitive and affective learning amongst students, but this may be enhanced significantly compared to that achievable with the classroom' (Nundy, 1999; 190)

Focusing on the hands-on, outdoor experience, Nundy (2001) and others (Orion, 1993; Rickinson, 2005; Maller, 2009) suggest that it is a process of reinforcement, or bridging, between the affective (emotional capability) and the cognitive (intellectual capability) domains [6] which affect higher order learning. Others such as Carrier (2009) describes 'how brain-based research (for example Kaufeldt, 1999; Konecki and Schiller, 2003)' has indicated 'that participating in authentic activities that connect to real-world experiences increase learning for both boys and girls and may increase dendrite[7] connections in the brain' (p.4). Orr (2004) describes this process as one that 'allows the senses to soak in the experiences as sights, sounds, tastes, smells, and feel until something like profound respect, or more, begins to take root' (p.96). He does, however, suggest that this process takes place over an extended period of time, something longer than a weekend trip, Whilst on a practical level this may not be achievable for all young people, the rationale for doing so is clear:

> *' [An] education that supports and nourishes a reverence for life would occur more often out-of-doors and in relation to the local community ... It would help people become not only literate but*

[5] See Christie & Higgins (2012) for further reading on the value of residential experiences.

[6] See Bloom, Engelhart, Furst, Hill and Krathwhol (1956) for further discussion of affective and cognitive learning domains

[7] Dendrites are extensions from cells that deliver information to and from the cell. They grow as a result of stimulation from, and interaction with, the environment and this can occur throughout life. With no stimulation, dendrites can retreat and disappear.

ecologically literate, understanding the biological requisites of human life on earth ... It means rediscovering and restoring the natural history of our places‘ (Orr 2004; 147 - 8)

Linked to these points, and core to Orr’s proposition, is the issue of place and the unique learning context that the natural environment offers.

2.1.2 The issue of place

In 2002 Higgins, in relation to Scotland and in respect of previous studies (Nicol and Higgins, 1998a, 1998b; White, 1998), drew attention to the potential of place within the context of outdoor learning as a way of developing cultural understanding. He wrote, ‘it can be contended that carefully planned experiences in the landscape we use for outdoor education can be invaluable in increasing understanding of social and economic history’ (p. 152). Taking this notion further he identified that the most relevant aspects of the history of Scotland relate to the ‘way in which land has been owned and used[8] ‘as this has had a considerable influence on the ‘national psyche‘ and the ‘sense of place’ of many Scots’. Yet recently, Harrison (2010) has noted that ‘place’ still remains ‘an under-researched and poorly documented element of UK and outdoor environmental education’. Little has been published within this field, at least from a Scottish perspective between these two papers (Higgins (2002) and Harrison (2010)). In light of this and in terms of outdoor learning there is a further imperative placed on schools to provide such ‘connecting’ outdoor experiences as modern urban environments generally limit children's access to nature (Rivkin, 1995, 1997; Moore and Wong, 1997; Kellert, 2002, 2005; Pyle, 2002; Louv, 2008; Maller, 2009). Yet, it is not enough to provide a context for learning; the process is twofold. Educators (adults, teachers, others) also have a key role to play in the learning process; they can encourage development and change by instigating a process of self-belief which enables young people to become agents of change.

2.1.3 The significance of ‘others’

Powell and Todd’s (2005) systematic review suggests, amongst other things, that ‘interactions between teachers and pupils convey messages about goal orientation and influence pupils' learning behaviours, relationship with the curriculum and, in turn, pupils' own goal orientations’ (p. 11). Similarly, Barron (2006), whilst investigating the relationship between interest and self-sustained learning as catalyst to development, revealed that outdoor learning (or fieldwork as it was described in this case) differed from school-based learning due to ‘the typical fusing of the intellectual and the emotional in informal environments’, in other words the affective and cognitive learning domains. Also, crucially, Barron (2006) suggests that this was due ‘to the primacy of the relationship between learner and teacher, in contrast to schools, which are more impersonal’ (p.197). Robinson and Kakela (2006) describe this fieldwork or informal environment as ‘creating a space for fun, interaction, and trust [where] teachers and students together can build a learning environment that promotes engagement, deep learning, and meaning’, and such a space ‘emphasizes process, not product, personalizes learning, and contributes to whole person development’ (p.202). Basile (2000) further highlights the critical role of the educator as one who ‘can influence the way students think, solve

[8] See Wightman, A (1996). Who Owns Scotland? Cannongate Press; Edinburgh for further reading on land ownership in Scotland.

problems, and become citizens, especially when both instructional and organizational factors focus on the goal of transfer' (p.26). Taken together there is evidence to suggest that the authentic and informal context provides rich opportunities for learning as well as an opportunity to develop peer and pupil-teacher relationships.

Foran (2005) further compounds this issue by introducing the concept of 'pedagogic intensity'. He suggests that 'the outdoors somehow magnifies the teaching experience' (p.147). His phenomenological examination of Nova Scotian teachers leading children outside for instructional purposes, revealed that 'intense encounters resulted from the relational focus in teaching outdoors, the place of learning, the emotions and feelings that emanate from uncertainty, the student growth, the risk, the excitement from hands-on learning, and the experiences of leading for the teacher outside the school' (p.160). The concept of intensity, in this case, is used not only to explain the 'extraordinary moments of these outside teachers, but more to describe the simple reality of being outside the school with students' (p.160). As such, intensity can be understood as a 'constant pathic connection that exists between teacher and student, resulting in a teaching intensity that is weaved with relationships, places of learning, events, memories and reflections, constructing a past informing the pedagogic present' (p.160). This intensity can be shared between the teacher and the pupil and, although not necessarily replicable indoors, once experienced it can be drawn upon and used to strengthen and deepen teacher- pupil relationships in other contexts, such as the classroom.

Currently, the Paul Hamlyn Foundation (Carne, 2012) are evaluating associated aspects of pupil-teacher relationships in terms of their impact upon student behaviour, attainment and development. This research forms one of a series of nested themes examined within their Learning Away programme[9] which offers residential experiences within secondary schools. Whilst there is an emphasis on the residential aspect rather than the 'outdoor' element *per se,* it would appear even at this early stage, that their initial findings support the broad notion that these experiences can help to foster and enhance positive pupil-teacher relationships and a deeper commitment and engagement to learning within a classroom context (Carne, 2012). Therefore, it would appear that this notion of pedagogic intensity may also be evident within residential experiences, where pupils and teachers share a common, 'prolonged' out-of-school experience[10]. The project outcomes and full evaluation will not be available until the initiative completes in 2014.

In 2008 Lackney considered the development of educational practice and suggested teacher training should be designed to a 'to assist teachers to gain insights by effectively using the physical settings to better support their teaching practices, and thus lead to more engaged learning on the part of their students' (p.134). More recently, Vergou (2010), who considered the links between experience and knowledge in school in relation to outdoor education experiences, refines Lackney's suggestions by identifying two strong sociocultural factors that influence general learning outcomes; first, 'pedagogy/instruction methods used by the educators' and

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[9]Learning Away is a £2.25m Special Initiative that aims to support schools in significantly enhancing young people's learning, achievement and well-being by using innovative residential experiences as an integral part of the curriculum. For further information see http://www.phf.org.uk/landing.asp?id=769

[10] See Christie & Higgins (2012) for further reading on the value and relevance of residential experiences.

second, ‘the content of the teaching‘ (p.80). Whilst these outcomes appear intuitive she stresses that ‘it should not be taken for granted that what students are taught is what they actually learn’ (p.80). Clearly, the transfer of learning is not straightforward.

2.1.4 Past experience and other influences

It is increasingly recognised that a number of external influences such as previous experiences of nature and the environment, parental and peer influences can affect a child’s overall enjoyment and learning (Bandura, 1989; Bixler, Carlisle, Hammitt and Floyd, 1994; Harris, 1999). Recently, James and Bixler (2008) stated that ‘social interactions, previous knowledge or experiences and culture act as filters for what becomes meaningful for a child participating in a new experience’ (p.45). This resonates with Dewey’s (1938) principle of the continuity of experience which assumes that ‘every experience both takes up something from those which have gone before and modifies in some way the quality of those which come after (p.34)’. Lobato (2012) supports this suggesting that ‘prior knowledge influences the comprehension of any new situation’ (p.232), as such, we are continually transferring learning from one experience to another. The process takes account of the socially situated nature of the experience, the individual learner and their past therefore the educator must be aware of the unexpected, and unintended, connections that individual learners can make (Lobato, 2012). Ardoin (2009) has related similar processes to behaviour change and suggests that whilst ‘a learning event may mark a watershed moment in an individual’s life, it more likely represents one in a series of cumulative events that may affect knowledge, attitude and skills, which have the potential to eventually link with changes in behaviour’ (p.170). A report prepared for Natural England by Kings College London (2011) highlights the practical implication of this very issue, stating ‘a class of 30 students exploring their local surroundings may well have 30 different individual experiences resulting in a complex and hard to measure set of personal outcomes’ (p.4).

In general, these views stem from constructivist theorists such as Piaget (1952) and Vygotsky (1978), and whilst they are not new; what *can* be considered as ‘new’ is the additional dimension offered by examining those learning theories in an outdoor context in terms of the potential synergistic benefits that such an approach can offer. For example, Weibel (2011) suggests that, ‘in addition to helping students feel part of their own learning process, being out in the environment can help foster a connectedness to nature’ (p.4). As such, the impact of outdoor learning is difficult to measure and quantify as often there are unforeseen situations offering a range of potential learning outcomes (Lobato, 2012).

Key findings:

- Education is not solely an indoor activity; teaching should ideally take place where it is best for students to learn, whether that be outdoors or indoors.
- ‘Place’ within the context of outdoor learning is an effective way of developing an understanding at a local level around issues such as history, culture and sustainability.
- Authentic and informal outdoor contexts provides rich opportunities for learning as well as an opportunity to develop peer and pupil-teacher relationships.

• Educators must be confident in their decision to teach out of doors. They must respect the socially situated nature of learning out-of-doors, the individual learner within that process which includes their previous experiences that they may bring to the process. And in light of these nuances, they must maintain an appreciation for the unexpected, and unintended, connections that individual learners can draw from one such experience. In other words, they must realise that what is 'learnt' is not necessarily what has been 'taught' which can make learning outcomes difficult to quantify.

2.2 What impact does outdoor learning have on behaviour and attainment?

2.2.1 *Outcomes for behaviour, motivation and engagement*

Behaviour management within schools is a perennial issue. In 2005, Munn *et al*. captured the longevity of the debate by stating that 'concerns about pupils behaviour are almost as old as schools' (p. 4). Yet within the last decade concerns regarding behaviour management, particularly as it 'pertains to addressing anti-social behaviour and improving learning and life outcomes for children and adolescents' are still a primary topic of discussion among educational stakeholders (White, 2010: 1). These concerns are not without evidence, a survey conducted by ICM research (2005)[11] revealed that 85% of teachers with more than 15 years of experience reported that disruptive and anti-social behaviour is progressively worsening and 60% of those teachers reported a behaviour crisis in schools at that time (White, 2010). More recently, others such as White and Warfa (2011) acknowledge the longevity of the issue and have highlighted a decline in standards over the last two decades.

Powell and Todd's (2005) systematic review of learning behaviour examined a range of studies and found consistent evidence that 'learning in school contexts is influenced by the interaction of a range of individual, curricular and social variables' (p.6). A number of themes emerged from their review, two of which are relevant to the point made in Section 2.1.3 regarding the role of the educator in the learning process. First, 'social interaction is pivotal to cognitive development and influences the development of learning behaviour in school contexts'. And, second, 'interactions between teachers and pupils convey messages about goal orientation and influence pupils' learning behaviours, relationship with the curriculum and, in turn, pupils' own goal orientations' (p. 10). Such findings support the pivotal role of the educator in the learning process and highlight the influence that social interaction can exert upon the development of positive behaviour.

Framed within outdoor learning these social interactions between 'learner' and 'teacher' can be deepened and heightened by introducing authentic learning situations. Beames *et al.* (2011) describe this as 'moving into a territory where learning outcomes are not always pre-determined but brokered between learner and teacher in such a way that the responsibility for learning is shared with all parties' (p.65). This reflects Dewey's recognition (noted in Bullough (2012)) of the impossibility of certainty in human affairs, which prompted Dewey to suggest that 'education is most of all an art' (p.346). In other words, a learning situation, either indoors or outdoors is determined by a range of influences unique to that experience at that time, and with those students present. As such, educators must be clear about their own justification for working out of doors. As Higgins (2010:13) argues, 'it must be a central expectation of a professional educator that he or she

[11] This report is cited in White (2010) and referenced as such. The original report was unobtainable.

is able explain to a student, parent, teacher and politician 'why (I am) doing this activity with each of these young people here now'. But, what of the wider evidence to support the impact of teaching and learning out of doors in terms of behaviour, motivation and engagement?

First, there are a number of studies which suggest that outdoor experiences can stimulate an interest in the natural heritage and so develop environmental orientation and pro-environmental behaviours (Kaplan and Talbot, 1983; Palmer and Suggate, 1996; Lohr and Pearson-Mims, 2005; Wells and Lekies 2006; Chawla, 2007; FCS, 2009). For example Banett, Lord, Strauss, Rosa and Langford and Clavez (2006) found that implementing a field-based urban science programme helped to increase student's attitudes towards science and towards the environment, more generally. Education for sustainable development research suggests that it is this connection that stimulates interest, embeds learning and thus supports behavioural change (see Christie & Higgins (2012) for a brief summary of recent research). Further, in terms of outdoor learning in Higgins (2002: 154) states the 'landscape within which a Scottish outdoor educational experience takes place has a complex environmental political and social history' therefore given this context, 'outdoor educator is uniquely placed' to address these wide and inter-related issues', hence 'an engagement with such issues should be a central theme in learning outdoors' (p. 154). This rationale reinforces the value of outdoor learning as it is 'the interconnectedness of these issues that is a vital aspect of learning' and it is that aspect which is 'difficult to deal with other than in an outdoor context' (Higgins, 2002: 154). In essence then, outdoor learning experiences should provide the connection and stimulation that facilitates positive attitudes (and hence positive behaviour) amongst students.

There is less evidence, however, concerning behaviour in terms of motivation, attitude and general classroom conduct. One of the most widely cited studies conducted by Lieberman and Hoody (1998) measured the impact of the 'Environment as an Integrating Context for Learning' (EIC) programme through a comparative control-based intervention. Evidence gathered from 40 participant schools suggested that EIC students earned higher grades and score better on general and subject-matter-specific tests and in some cases EIC students had better attendance and less disciplinary programmes than the control group. As, Weibel (2011) notes it is the unique nature of experiences outside the classroom that provides 'a more cognitive and personal level of thinking which can influence children's attitudes' (p.18). Others such as Barnett *et al.* (2006), Brody (2005), Kola-Olusanya (2005) and Louv (2008) support this.

Recently, White and Warfa's (2011) research suggests that the implementation of a socio-culturally inspired character-education programme can have positive effects on pupil behaviour, classroom climate and curriculum delivery and engagement. Their mixed-method case study approach did not use an outdoor learning context yet their results are relevant as successful aspects of their programme resonate with outdoor learning. For example they noted success in terms of 'children's rational and ethical decision-making, problem-solving, and conflict-resolution skills' as well as overall 'school ethos and the well-being and developmental needs of all students' (2011: 47). Also, this study took account of the whole school context, rather than a traditional intervention type approach where a 'programme' is bolted on to the main curriculum. Again, this reflects the rationale underpinning outdoor learning and supports the Scottish Government's

policy guidance in this area. For example, recently, the Scottish Government (2007) stated that the curriculum "must be inclusive, be a stimulus for personal achievement and, through the broadening of pupils' experience of the world, be an encouragement towards informed and responsible citizenship". They also suggested that 'outdoor learning offers an ideal framework for achieving the four capacities as detailed in Curriculum for Excellence' (Scottish Government, 2007).

Similarly, Stern, Powell and Ardoin (2010) have recognised these commonalities and have suggested that character development, leadership and other life skills may result from environmental education programming. Others such as Wells and Evans (2003) have demonstrated that simply having access to vegetation and, or, having natural areas near to homes and schools can help to bolster the resilience of children and others encountering stress, challenge or adversity. They state that 'natural areas proximate to housing and schools are essential features in an effort to foster resilience of children and perhaps to promote their healthy development' (p.327). This is pertinent given the focus in the Scottish Curriculum for Excellence on the development of the four 'capacities' ('successful learners, confident individuals, responsible citizens and effective contributors' (LTS, 2010a, b) as well as other educationa initiatives such as Heathy Schools (Scottish Government 2007) or citizenship education (Munn & Arnott, 2009) designed to develop affective learning outcomes (such as resilience, coping and other attitudinal or emotional areas of personal development).

Beames *et al.* (2011) recognise these multi-dimensional and synergistic benefits and suggest that 'integrating outdoor and indoor teaching capitalizes on children's natural curiosity about people and places encountered in their everyday lives' (p.111). This gains increasing relevance when it is framed within a wider socio-cultural view, which suggests that children's use of space has changed in recent decades from being primarily indoors to outdoors (Clements 2004; Karsten (2005). Tanner and Lackney (2006) considered students use of space and the relevance of architecture and school ground design. They reported that students perceive that their learning extends beyond the classroom and that schools with poorly designed outdoor spaces demonstrate lower achievement scores (Tanner, 2000, 2006, 2009). Whereas schools which create opportunities for outdoor learning as compared to indoor learning report that students 'learn more quickly, appreciate the experience more and retain skills longer' (Tanner, 2001; 66). Such schools, which include outdoor learning environments within school grounds, 'invite nature to blend with the school's function and form' (Tanner, 2000; 327). He describes how these urban schools, whose students score highly on the Iowa Test of Basic Skills[12] (ITBS), were 'far removed from forest lands but they had a curriculum focus on plants and provided a natural habitat for animals' and coincidentally 'none of the low scoring schools had positive outdoor spaces' (2001; 327). He further notes, and in doing so acknowledges David and Weintstein's (1987) contribution to his point, that the 'attachment to objects and places are central to the emotional life (affective and behavioural dimensions of learning) of the young child' (2001; 328)

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[12] The Iowa Test of Basic Skills (2008) was constructed to describe a student's developmental level, identify areas of relative strength and weakness in subject areas, and monitor year to year growth in the basic skills. In this study Tanner considered reading comprehension, reading vocabulary, language ares, mathematics, social studies and science. Fro further information see http://www.education.wiowa.edu/itp/itbs/index.htm

Others have also considered the effect of school ground design and it's possible impact upon student attainment and development. For example studies such as those conducted by White (2000), Wells (2000), Wells & Evans (2003) have all demonstrated potential links between stress reduction, general academic attainment and student's increased ability to focus after spending time in, or near natural settings. Some studies have explored Attention Restorative Theory (ART). ART is premised upon the notion that 'directed attention plays an important role in human information processing; its fatigue, in turn, has far reaching consequences' (Kaplan 1995, 169). ART provides an analysis of the kinds of experiences that lead to recovery from such fatigue and natural environments turn out to be particularly rich in the characteristics necessary for such restorative experiences. Research exists which suggests that simply having a view of nature can lead to benefits associated with ART (Kaplan, 1995, 2001; Kuo, 2001; Tenessen & Cimprich, 1995). Others such as Taylor, Frances and William (2001) have narrowed their focus further and explored the potential for nature and natural settings to provide psychological benefits to children diagnosed with Attention Deficit Disorder. Their research, one of the earliest studies of it's kind, suggests that natural settings can help to reduce the impact of ADD in children. Their study was one of the earliest to explore the potential for nature and natural settings to provide psychological benefits to children diagnosed with ADD. Therefore there is some evidence to suggest that the development of school grounds and their use as a low-cost, easily accessible site for outdoor learning is beneficial on a number of levels.

More recently, Ardoin, Clark and Kelsey, (2012) forecasted future trends in environmental education research and one of the emergent themes concerned 'the need for additional work on behaviour change and related theories' (p.17). Whilst 'behaviour change' involves the development of pro-environmental behaviours, 'related theories' include broader aspects of personal and social development concerning 'the contribution of awareness, attitude, knowledge, skill, intention, value, competence and social norms on behaviour change' (p.17). In summary, more research in this area is warranted and future research should as Ardoin, Clark and Kelsey (2012) suggest, focus upon broader aspects of students personal and social development rather than subject or behaviour specific outcomes.

Key findings:

- A learning situation, either indoors or outdoors is determined by a range of influences unique to that experience at that time, and with those students present. As such, educators must be clear about their own justification for working out of doors and have the *confidence* and *knowledge* to adapt to their practice to suit that situation.
- There are a number of studies which suggest that outdoor experiences can stimulate an interest in the natural heritage and so develop environmental orientation and pro-environmental behaviours. And, this is supported by education for sustainable development research which also suggests that it is this connection (through educational, out-of-door and hands-on experiences), that stimulates interest, embeds learning and thus supports behavioural change. Therefore outdoor learning experiences should provide the connection and stimulation that facilitates positive attitudes (and hence positive environmental behaviour) amongst students.

•There is less evidence, however, concerning behaviour in terms of motivation, attitude and general classroom conduct.

• Research concerning the link between 'green' or natural school grounds and student behaviour suggests that there a modest gains in terms of stress reduction, general academic attainment and increased ability to focus (akin to attention restorative theory) following time spent in those spaces.

•Future research should focus upon broader aspects of students personal and social development rather than specific behavioural outcomes.

2.2.2 Outcomes for subject specific and general academic attainment

A number of studies exist which provide evidence of a link between environmental education (EE) programs and general academic attainment. For example Leiberman and Hoody (1998) - as discussed previously in Section 2.3 - found students who had participated in an 'Environment as an Integrating Context for Learning' (EIC) program performed better on standardised tests in reading maths, writing, science and social science than those pupils who did not participate. Similarly, other such as Billings, Plato, Anderson and Wiley (1996), Lieberman *et al.* (2000) and NEETF (2000) also suggest that EE may improve student learning and those subjects that tend to improve are reading, maths, science and social science. Apart from this evidence, however, very few empirical studies exist to support these findings.

Others such as Bartosh, Tudor, Ferguson, and Taylor (2006) sought to address this by investigating 'the impact of environmental education (EE) programmes on student achievement in maths, reading, and writing by comparing student performances on two standardised tests for environmental education schools and schools with traditional curriculum' (p.161). They employed a quantitative analysis and their results indicate that, 'schools with integrated environmental education programs outperform comparable "non-EE" schools on the tests', suggesting a 'pattern or trend between the level of implementation of environmental education and student achievement' (p.161). Crowder (2010) conducted a similar study which explored the influence of outdoor learning on engagement in core academic content - English, biology, algebra and geometry, and involved case studies of 14 'at-risk of failing' high school students, during three separate outdoor lessons. Her findings suggest that 'high quality learning environments' enhance 'student engagement; academic, behavioural, psychological, and social' by establishing 'an increased conceptual understanding of core concepts, through hands-on learning activities supported by group work in a number of flexible, open spaces on campus' (p.v). She notes how 'students appreciated the fresh air, green environment, open spaces, views, ease of movement, and close relationship to nature' and 'valued having a choice of how and with whom they worked, as well as freedom from the direct supervision of their teachers' (p.v). Similarly, Randall (2001) considered the enhancement of student writing skills through the introduction of a biodiversity education programme using a pre/post design involving 132 pupils from two classes in a Florida High School. She revealed that 'supplemental environmental education curriculum can be designed to support state standards and it's use can improve skills measured by the state assessment test' (pg.x). In this case, the state standards were Florida Sunshine State Standards and the state assessment test used referred to the writing portion of the Florida Comprehensive Assessment Test.

In contrast to such localised evaluations, others such as Carlson (1988), Lieberman (1995), Braus (1999), and Kaspar (1999) have taken a broader view. Generally, these studies suggest that environmental education can help teachers meet curricular and reform goals as both seek to provide students with the skills needed to be effective citizens. Additionally, outdoor learning lends itself to cross-curricular activities, allowing a range of subject areas to become the focus. As Beames *et al.* (2011) suggest 'outdoor learning is a key way of integrating curricular content that, depending on age and stage, is often traditionally taught in separate subjects areas (e.g. geography, literature, ecology an history' (p.7). The affordance offered by outdoor learning as a means of integrating curricular content and broader skill development appears to have received greater research attention than the investigation of 'effect' between single subject areas and specific outdoor experiences. In light of this, and given the quality and nature of the research included in this brief review, it would appear that this broader, less subject-focused approach offers a more effective framework for future research development. If a key aspect of outdoor learning is it's ability to deliver across subject areas, then perhaps research should reflect this interdisciplinarity and relate to broad curriculum areas. Within a Primary-school context, this approach would reinforce the integrative nature of outdoor learning and encourage its integration into teaching practice at a fundamental level, rather than a tool to simply extend learning in a specific subject area. However, at a Secondary-school level, where there is less opportunity for interdisciplinarity due to timetabling and other pressures, it may be that the subject-specific links are more valuable as a method of gaining staff support in the first instance before moving on to explore the wider, synergistic benefits afforded. (This issue of future research development is explored in relation to methodological approaches in section 2.4)

Interestingly, a similar division between integrated and subject-specific research has developed within environmental education research. For example, Ramsey, Hungerford, and Volk (1992) demonstrate how environmental education can be integrated within an existing curricula in the areas of science, health, social studies, math, language arts, home economics, and agriculture. This process enables teachers to draw upon outdoor learning as a necessary, rather than additional, exercise (Beames *et al.*, 2011; Beames and Ross 2010). This is not a 'new' phenomenon, others have discussed the issue of integration or infusion previously, for example Braus (1999), Cantrell and Barron (1994) (in terms of environmental education) and Rickinson (2001) (in terms of fieldwork).

More recently, however, Blair (2009) has examined the efficacy of the school gardens as a method to deliver environmental education and encourage cross-curricular learning (specifically food education). Her review of qualitative, quantitative and survey research 'supports the conclusion that school gardening can improve students' test scores [general academic tests] and school behaviour' (p.35). Specifically, 'gardens can improve the ecological complexity of the schoolyard in ways that promote effective experiential learning in many subject areas of science, environmental education and food education' (p.35). Continuing with this theme, a recent doctoral study by Bonyton (2010) examined the 'differences and similarities of school gardens as learning spaces by exploring a fifth grade [10-11 year olds] standards-based mathematics lesson in both a classroom and school-garden setting (p.i). Her results indicated that 'gardens may affect a higher use of space for lessons and higher bi-directional interactions for participants in those lessons'. She defines

bi-directional ‘as the interaction that occurs between people, in this case between teachers and students, students and students, and groups of students with groups of students’ (p.43). As such, ‘high bi-directionality of interactions seems to correspond to high use of space, positive climate, and group interaction as well as higher student concept attainment in the math scores’(p.43). Therefore, according to Bonyton (2010) ‘these findings could inform our understandings of the potential for creating more equitable learning spaces’, furthermore, school gardens ‘may be more effective for lower achieving rather than higher achieving students’ (p. i).

Robinson and Kakela (2006), when reflecting on their undergraduate programme which offers teaching both in- and out-of-doors, suggest that students who learn in this way [through fieldwork] ‘emerge as more creative, critical, integrative thinkers, and we hope they will become empowered, lifelong learners’ (p.202). They expect their undergraduates to improve their environmental and natural resource problem-framing and problem- solving skills as a result of their overall experience; and, generally, their undergraduates thrive (p. 207). Others have examined the global affect of an outdoor experience. For example, James and Bixler (2008) considered the influence of a three-day residential environmental education experience for 20 gifted 8- 11 year olds and found that ‘sensory rich experiences’ and ‘social interactions’ were commonly influential (p.57). This correlates with O’Brien *et al’*s (2011) point that learning occurs when there is a combination of *being* outdoors and *being hands-on* outdoors.

In summary, outdoor learning may offer an effective context for increasing general academic attainment, and this has a modest level of support in terms of maths, English, reading, science and social studies (Natural England, 2011). It has also been highlighted as a method for reducing the gap between high and low achievers . This, in turn, may impact upon general attainment and potentially increase positive behaviour and motivation[13] too. Therefore, in light of the research examined within this review, it would appear that there are opportunities for cross-curricular development and attainment through outdoor learning, environmental education and fieldwork.

Key findings:

- Outdoor learning affords an integration of curricular content and broader skill development.
- It appears that greater research attention has been given to broader development for example critical thinking, social skills and problem solving *per se*, rather than the investigation of ‘effect’ between single subject areas and specific outdoor experiences. Although there appears to be modest of support for increased attainment in terms of maths, English, reading, science and social studies.
- There may be greater value in taking a general, rather than a subject specific view of potential learning outcomes, due to the combination and variability of factors unique to a given experience (the individual, the educator, the place, the weather and so on) as well as the instinctive (yet, planned for) nature of learning out of doors.

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13 (the relationship between behaviour and motivation is well researched, for example Green, Liem, Martin, Colomar, Marsh and McInerney (2012) and Kozeki and Entwistle (2011)).

2.3 The wider policy context; what next?

In short, more research in this area is warranted. Especially when we consider the substantial and growing policy interest in this area, with for example a manifesto commitment by the incoming Scottish Government in 2011, that led to the appointment of the recent Ministerial Advisory Group on 'One Planet Schools'[14]. This aims to 'bring together sustainable development, global citizenship education and outdoor learning and is intended to help deliver priorities including raising attainment, improving behaviour, inclusion and health and wellbeing'. The clear focus will be on the development of 'whole school approaches to sustainability in schools and enable a sharper, more coherent approach within the context of Curriculum for Excellence', and reflect the general thrust of the Scottish Governments new educational framework 'Learning for Change'.

This process is proceeding in parallel with other measures in the General Teaching Council for Scotland regarding the 'professional standards for Scottish and global sustainability' which focus on Education for Sustainable Development and outdoor learning. This is in development at present but if implemented will means that all pre-service teacher trainees and eventually all practicing teachers will need to demonstrate growing confidence and competence in managing education for sustainable development and outdoor learning. These factors make the present review very timely, and allows us to emphasise that there is clear need for further research and understanding of the potential impact of outdoor learning in terms of whole school attainment and positive student behaviour.

Key findings:

- Current Scottish policy development and governmental interest is becoming increasingly focused towards the development of confidence and competence amongst pre-service and practising teachers in managing education for sustainable development and outdoor learning.
- Currently there is modest positive and yet limited evidence concerning
  - a) the impact of outdoor learning on general behaviour change, and
  - b) on specific behaviour in terms of motivation, attitude and general classroom conduct;
  - c) the impact of environmental education and outdoor learning on the development of *pro-environmental* behaviours.
- Therefore there is a clear need to address points a), b), and c) and conduct high quality research in those areas.
- . Research and evaluation should proceed in *parallel* with developments within the General Teaching Council, Ministerial advisory groups and Teacher Education Institutions. Thus a comprehensive range of evidence informed, practical support can be developed *alongside* such policy developments.

2. 4 Note on gender

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[14] The terms of reference and the minutes of meetings are available at http://www.scotland.gov.uk/Topics/Education/Schools/curriculum/ACE/OnePlanetSchools

Whilst it is has been acknowledged by some that girls generally outperform boys at secondary and tertiary education levels (Younger, Warrington and Williams, 1999; Frances, 2000) there is limited evidence of gender differences in cognitive or affective learning as a result of field-work (Easton and Gilburn, 2012) and/ or outdoor learning.

Carrier (2009) conducted a quasi-experimental pre- and post-test investigation which involved 8-11 year olds and compared activities conducted in the schoolyard with traditional classroom activities, in respect of gender. It had previously been proposed, e.g by Taylor and Lorimer (2003) that strategies providing more authentic, action-oriented activities can benefit boys more so than girls and Carrier's (2009) results substantiate this 'as boys who participated in the outdoor lessons, increased learning when compared with boys who participated in the traditional classroom lessons' (p.9). She concludes that, 'the factors that contribute to students' learning are multiple and varied' and 'when educators are aware of students' learning styles, use authentic locations, and provide opportunities for engaging active learners, student learning may be enhanced'(p.10). She also suggests that whilst 'the outdoor activities can offer an increase in involvement for both boys and girls' it is the outdoor setting that 'presents opportunities for boys to solicit more praise and experience social or relational bonding, both of which can relate to positive learning experiences (Deci and Ryan, 2000)' (p.10). As such, she recommends that the nature of the 'connections that both boys and girls experience in the outdoor settings, such as their feelings of personal involvement, sense of autonomy, and societal acceptance, deserve further study' (p.10).

Another study by Easton and Gilburn (2012) examined field-work and courses within undergraduate biology degrees, and considered the influence of a ten-day residential field course on attainment and cognitive learning and the impact of gender. Despite finding overall grade improvements for those attending the field course than those who did not, they found no difference between the gender cohorts; females outperformed males irrespective of attendance. They do however, suggest that this may be an area for future study and recommended employing a mixed-method approach to do so.

Key findings:

- In terms of general academic attainment, previous studies have highlighted that girls outperform boys in secondary and tertiary education
- There is, however, some evidence (Carrier, 2009) to suggest that boys (in upper Primary school, aged 8-11) appear to react positively to the opportunities that outdoor learning presents for social or relational bonding.
- By tertiary education there appears to be no difference between gender cohorts. Easton & Gilburn (20120) report that both male and female undergraduate students respond positively to field-work and females continue to outperform males irrespective of attendance.
- Gender and outdoor learning has been highlighted as an area for future research. This is due to it's under-researched potential to redress this gender imbalance.

2.5 Note on mixed-method research

Currently, mixed-method research is popular and advocated, for example White and Warfa (2011) promote 'qualitative and multi-method approaches when doing research among school populations with complex situations and social needs'. More recently, Bullough (2012: 347) suggests that we should not strive for pure outcomes, rather we should accept that 'impossibility of certainty in human affairs' and acknowledge that 'research and theory ought to produce a 'wider field of observation' rather than constrict vision' (p. 347). Bullough highlights Dewey's (1910:15) assertion that '... it is very easy for [the results of research] to be regarded as a guarantee that goes with the sale of goods rather than as a light to the eyes and a lamp to the feet'.

Returning to school-based education, Bullough (2012) suggests that 'a tempering of the ambition to fix things is also needed' and this should be 'replaced by a lively desire to better understand and build far-reaching, inclusive and generous research communities that do not deny the challenges of uncertainty, but delight in them' (p. 355). Others such as White (2011), Randall (2012), White and Warfa (2012), Easton and Gilburn (2012) support this. For example Goodyear (2011) suggests that large-scale intervention testing is looking increasingly 'clunky and quaint' and he predicts an increased move towards qualitative, interpretivist research:

….we will see a further erosion of claims that large-scale, randomised testing of interventions is a gold standard for education research. The very idea of a standardised intervention looks unconvincing as soon as one takes into account the variety of work that participants undertake in order to perform the intervention' (p. 259)

This shift from typical pre-, and post- intervention research design to broader, mixed-methodologies reflects the general tenor of opinion gathered through this review from within the field of outdoor learning. If we are suggesting that outdoor learning is a corollary to to indoor learning and, as such, its impacts are cross-curricular, integral to all aspects of the curriculum and offer a holistic approach to global development then it would seem likely that we search for evidence to support these claims in a similarly holistic manner. To do otherwise would, following that logic, would produce a fairly one-dimensional view of what is arguably a multi-dimensional concept[15]. Therefore, it would seem likely then that future research continues to follow the trend towards mixed-method research rather than the previously favoured quantitative pre-post design.

Key findings:

- In the field of education, generally, there appears to have been a general shift towards mixed method research. And, this shift is reflected in the field of outdoor learning.

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[15] See Christie, B., Higgins, P., Beames, S., Nicol, R & Ross, H. (2012). *Exploring the multi-dimensional concept of outdoor learning; a brief literature review.* Edinburgh: University of Edinburgh, for further reading.

- This combined approach affords a more comprehensive approach which supports the philosophical rationale underpinning outdoor learning which is premised upon global and holistic development of the whole person, the environment and the community and place in which they live rather than specific development in one curricular area within one particular set of circumstances.
- Future research in outdoor learning seems likely to trend towards mixed-method research

2.6 Note on the uncertainty of knowledge in education and the notion of best-practice

In most, if not all, of the literature there is a degree of uncertainty surrounding the generalisability of the findings. This uncertainty is valid and not germane to outdoor learning, in fact it is widely recognised by others in the broader field of educational research. For example Markauskaite, Freebody and Irwin (2011) argue that 'researchers in education, social work and social policy face unique challenges: they are constantly on call to respond to society's demand to design and conduct research that can simultaneously contribute substantially to knowledge and inform policy and practice' (p.3). Add into this Biesta's (2007) point that 'educational practice consists of situations which, in a sense, are always new and unique' (p.300) and it is hardly surprising that Marakaukaite *et al.* (2011: 4) concede that 'what constitutes evidence has become increasingly contested'.

Neither is this uncertainty phenomenon recent, Dewey (1926) wrote in ' A Study of the Relation of Knowledge and Action' of his concern for the sort of knowledge that enables purposeful and effective action even though in the important matters of life and most certainly when confronting the problem of education that knowledge is always partial and never fully adequate'. Bullough (2012), echoing Dewey (1926), states that future research must 'assume the impossibility of certainty in human affairs' as 'education is most of all an art' and not, perhaps, a science with established laws and practice (p. 346). He further warns, again as did Dewey, that there are dangers inherent in the 'reduction of educational practice to rules' and 'right practice' (p. 346).

Often, however, evidence of effectiveness of educational programmes are cited after the initiative has been implemented. In such cases the evaluation is completed post-hoc to justify the monies spent and time invested. Slavin (2008) identifies this issue and notes that 'educational programs adoption more often follows the pendulum swing of fashion, in which practices become widespread despite limited evidentiary support and then fade away regardless of the findings of the evaluation' (p.5). For example Adams, LeCroy and Matto (2009) describe the situation in social work where 'it is an accepted fact that those approaches with the most evidence of effectiveness also happen to be those that have lent themselves most readily to replication and testing' (p.170)

There is also a concern that research is translated into practice, as highlighted by Slavin (2008:13), who suggests that 'clear thoughtful syntheses in many cases are crucial to providing practitioners, policy makers, and researchers with valid information that they can use with confidence to address the real problems of educating all children'. Others such as Rickinson (2005) have attempted to explore the difficulties

encountered by educators when using research to inform practice, and further research in this area is warranted (Ardoin, Clark and Kelsey, 2012). This links to another concern related to research informed practice, and the issue of 'best practice' (Bullogh, 2012). The notion of 'best practice' contradicts the nature of research in this field as Coffield and Edward (2012) argue the term 'implies that there is only one approach which, if used, will solve any difficulties' and that there is 'one true model which only needs to be discovered and disseminates for standards to rise' (p.375). They further caution that any claim that a particular method or resource is 'good' or 'best' practice needs to be met with the following questions: who says so? on what evidence? using what criteria? 'best' for whom? under what conditions? with what type of students?' (p.377).

Equally, these questions could apply to research and evidence within outdoor learning. This could help to provide the answers to Higgins' (2010) statement (mentioned earlier) that, 'it must be a central expectation of a professional educator that he or she is able explain to a student, parent, teacher and politician 'why (I am) doing this activity with each of these young people here now'(p.13). Such questioning, if adopted and researched, would provide a basis for claims of outdoor learning as sound pedagogy.

This section is not intended as a disclaimer and it should not be interpreted as one, rather it is recognition of the fact that there is an inherent element of uncertainty within educational research which is implicit in the complexity of the territory. Given this uncertainty then, research should not chase an end goal of 'best practice' instead practitioners and researchers should continually seek to improve their own practice and the experience of those whom they teach and learn with, and from.

However, and in spite of this equivocality, the impact of outdoor learning is convincing and there are many benefits to this approach.

Key findings:

- In most, if not all, of the research literature related to outdoor learning there is a degree of inherent uncertainty surrounding the generalisability of the findings which reflects the complexity of the field.
- Given this uncertainty, it is suggested that practitioners should not seek an end goal of 'best practice' or a blueprint for outdoor learning instead they should continually seek to improve their own practice and the experience of those whom they teach and learn with, and from.
- Similarly, research in the field of outdoor learning should not focus solely on an ultimate end goal of subject-specific attainment. Rather, it should respect the complexity of the practice and appreciate the individual nuances created and developed by each outdoor learning experience.

3. Concluding comments

This review has examined literature relating to practices in outdoor learning that may lead to changes in attainment and behaviour in schools. It is premised upon the belief that it is not logical, efficient or sensible to assume that education is solely an indoor activity. It has been conducted in respect of current Scottish

policy development and government interest which appear increasingly focused towards the development of confidence and competence amongst pre-service and practicing teachers in managing education for sustainable development and outdoor learning.

In summary, the key finding from this review is that:

- *whilst some research offers modest support for increased attainment in terms of specific subject areas such as maths, english, reading, science and social studies, greater evidence exists to suggest that outdoor learning affords an integration of curricular content and global skill development*.

It is worth noting that this falls in-line with the general philosophy and purpose of Scotland's Curriculum for Excellence (REF). As such, we suggest that there may be greater value in taking a general, rather than a subject specific view of potential learning outcomes, due to the combination and variability of factors unique to a given experience (the individual, the educator, the place, the weather and so on) as well as the instinctive and serendipitous (yet, planned for) nature of learning out of doors. Additionally, in most, if not all, of the research literature related to outdoor learning there is a degree of inherent uncertainty surrounding the generalisability of the findings; we believe that this uncertainty reflects the complexity of the field.

There are, however, three clear themes which emerge from the literature which appear as core prerequistes to a positive outdoor learning experience:

- First, authentic and informal *outdoor contexts provide rich opportunities for the development of peer and pupil-teacher relationships;* such connections are central to young people's attachment and commitment to school and their academic career, more generally.

- Second, *'place' within the context of outdoor learning is key to the development of an understanding, at a local level, of issues such as history, culture and sustainability.* Again, such knowledge and connection helps to foster positive attachments, commitment and respect for local areas, and school can be considered as a central part of the wider community.

- Third, *educators must be confident in their decision to teach out of doors.* They must respect the socially situated nature of learning out-of-doors, the individual learner within that process which includes the and the past experiences that they may bring to the process. And in light of these nuances, they must maintain an appreciation for the unexpected, and unintended, connections that individual learners can draw from one such experience. In other words, they must realise that what is 'learnt' is not necessarily what has been 'taught' which can make learning outcomes difficult to quantify.

Following this conclusion, education, specifically the process of teaching and learning out-of-doors is well placed to develop young people's general academic attainement. And, we suggest, given the recent policy interest, research and evalaution should proceed in parallel with developments within the General Teaching Council for Scotland, Ministerial advisory groups and Teacher Education Institutions. Such a strategic approach would ensure that a comprehensieve range of evidence informed, practical support can be developed alongside future policy development. Thus, outdoor learning can become part of teacher training (at pre- and in-service levels) and educational practice rather than an extra or novel activity that's very existence, rather than its specific qualities and potential, needs to be continually justified.

4. References

Adams, K., LeCroy, C., & Matto, H. (2009). Limitations of evidence-based practice for social work education: Unpacking the complexity. *Journal of Social Work Education*, 45 (2), 165-186.

Ardoin, N. (2009). Behaviour change theories and free-choice environemntal learning. In *Free-choice Learning and the Environment,* edited by J.Falk, J.E. Hiemlich, and S.Foutz, Lanham, Md: AltaMira Press.

Ardoin, N., Clark, C., & Kelsey, E. (2012). An exploration of future trends in environemntal education research. *Environemental Education Research,* DOI: 10.1080/135046622.2012.709823

Bandura, A. (1989). Social cognitive theory. In R. Vasta (Ed.), Annals of child development. Vol. 6: Six theories of child development (pp. 1–60). Greenwich, CT: JAI Press.

Barnett, M., Lord, C., Strauss, E., Rosca, C., Langford, H., Chavez, D., & Deni, L. (2006). Using the urban environment to engage youths in urban ecology field studies. *The Journal of Environmental Education*, 37 (2), 3-11.

Barron, B. (2006). Interest and self-sustained learning as catalysts of development: A learning ecology persepctive. *Human Developmen*t, 49 (4). 193-224.

Barton, B. (2007). *Safety, risk, and adventure in outdoor activities*. London: Sage.

Bartosh, O., Tudor, M., Ferguson, L. & Taylor, C. (2006). Improving Test Scores Through Environmental Education: Is It Possible?, *Applied Environmental Education & Communication*, 5:3, 161-169

Basile, C. (2000). Environmental Education as a Catalyst for Transfer of Learning in Young Children. *The Journal of Environmental Education,* 32(1), 21-27

Beames, S. & Ross, H. (2010). Journeys outside the classroom. Journal of Adventure Education & Outdoor Learning, 10(2), 95-109

Beames, S., Higgins, P., & Nicol, R. (2011). *Learning Outside the Classroom; Theory and Guidelines for Practice*. London: Routledge.

Bell, S., Hamilton, V., Montarzino, A., Rothnie, H., Travalou, P., & Alves, S. (2008). *Greenspace and Quality of Life Literature Review*. Greenspace Scotland.

Bird, W. (2007). *Natural thinking*. Online at http://www.rspb.org.uk/Images naturalthinking_tcm9-161856.pdf (accessed 11/09/12)

Biesta, G. (2007). Bridging the Gap between educational research and educational pracatice: The need for critical distance. *Educational Research and Evalautaion,* 13, 295-301.

Billings, J. A., Plato, K., Anderson, J., & Wiley, M. S. (1996). *Washington Environmental Education Model Schools Program "Environmental education in the school culture: a systemic approach." What did we do? What did we learn?* A final report submitted to the U.S. Environmental Protection Agency by the Washington State Office of Superintendent of Public Instruction. Olympia, WA: OSPI.

Bixler, R. D., Carlisle, C. L., Hammitt, W. E., & Floyd, M. F. (1994). Observed fears and discomforts among urban students on school field trips to wildland areas. *The Journal of Environmental Education*, 26(1), 24–33.

Blair, D. (2009). The child in the garden: an evaluative review of the benefits of school gardening. *The Journal of Environmental Education,* 40 (2), 15-38.

Bloom, B., Engelhart, M., Furst, E., Hill, W., & Krathwhol, D. (1956). *Taxonomy of educational objectives: the classification of educational goals; Handbook I: Cognitive Domain* New York, Longmans, Green, 1956.

Boynton, C. (2011). *Learning spaces in school: comparing maths instruction and Learning in school gardens and classrooms.* Unpublished PhD theses. University of California.

Braus, J. (1999). Powerful pedagogy: Using EE to achieve your education goals. *Educator*, Spring, 1999, Special Issue, 17–24.

British Educational Society (2004). *Schools and Fieldwork.* Online at http:// www.britishecologicalsociety.org/documents/policy_documents/parliamentary_briefings/ Field_work_in_Schools.pdf (accessed 11/09/2012)

Brody, M. (2005). Learning in nature. *Environmental Education Research, 11*(5), 603- 621.

Bullough, R. (2012). Against best practice: uncertainty, outliers and local studies in educaitonal research. *Journal of Education for Teaching*, 38, (3) 343-357.

Cantrell, D. C., & Barron, P. A. (1994). *Integrating environ- mental education and science.* Newark, OH: Environmental Education Council of Ohio.http://www.eeco-online.org/publications/pdfs/beeps.pdf

Carlson, E. A. (1998). A prospective longitudinal study of disorganized/disoriented attachment. *Child Development, 69*, 1107–1128.

Carne, P. (2012). Learning Away Research Update. Paper presented at 12th European Institute for Outdoor Adventure Education and Experiential Learning Conference. *European Outdoor Learning Seminar: Outdoor Learning as a means of promoting healthy and sustainable lifestyles and social inclusion for young people.* Derwent Hill, Lake District, UK 26-30th Oct 2012.

Carrier, S. (2009). Environmental Education in the Schoolyard: Learning Styles and Gender, *The Journal of Environmental Education,* 40 (3), 2-12

Chawla, L. (2007). Childhood Experiences Associated with Care for the Natural World: a theoretical framework for empirical results', *Children, Youth and Environments,* 17 (4), 144-170.

Chawla, L. & Cushing, D. (2007). Education for strategic environmental behaviour. *Environmental Education Research,* 13(4), 437-452.

Christie, B., Higgins, P., Beames, S., Nicol, R & Ross, H. (2012). *Exploring the multi-dimensional concept of outdoor learning; a brief literature review.* Edinburgh: University of Edinburgh.

Christie, B. & Higgins, P. (2012). Residential outdoor learning experiences and Scotland's school curriculum: an empirical and philosophical consideration of progress, connection and relevance. *Scottish Educational Review* 44(2) 45-58.

Christie, B. & Higgins, P. (2012). *The impact of outdoor learning experiences on attitudes to sustainability: a brief review of literature.* Field Studies Council/University of Edinburgh. Field Studies Council Report 06/2012.

Clay, G. (1999). Outdoor and Adventurous Activities: An OfSTED survey. *Bulletin of Physical Education,* 35 (2), 83-90.

Coffield, F., & Edward, S. (2009). Rolling out 'good', 'best' and 'excellent' practice. What next? *British Educational Research Journal,* 35(3), 371-390.

Crowder, L. (2010). *The influence of the outdoor learning environment on student engagement.* Unpublished PhD thesis, San Deigo State University.

David, T. & Weinstein, C. (1987). The built environment and children's development. In Weinstein, C.S. and David, T.. (Eds), *Spaces for Children: The Built Environment and Child Development,* Plenum Press, New York, NY, pp. 3-40.

Deci, E., & Ryan, R. (2000). The "what" and "why" of goal pursuits: Human needs and the self determination of behavior. *Psychological Inquiry*, 11, 227–269.

Dewey, J. (1910). *The influence of Darwin on Philosophy.* New York: Henry Holt and Company.

Dewey. J. (1926). *A Study of the Relation of Knowledge and Action.* New York: Henry Holt and Company.

Dewey, J. (1938). *Experience and Education.* New York: Macmillan.

Dismore, H., & Bailey, R. (2005). "If only": Outdoor adventurour activites and generalised academic development, *Journal of Adventure Education and Outdoor Learning,* 5 (1) 9-19.

Easton, E. & Gilburn, A. (2012). The field course effect: gains in cognitive learning in undergraduate bioligy students following a field course. *Journal of Biological Education,* 46 (1), 29-35.

Ernst, J. (2007). Factors influencing K-12 teachers' use of environment-based education. *The Journal of Environmental Education*, *38*(3), 15-32.

Folkestad, G. (2006). Formal and informal learning situations or practices formal and informal ways of learning. *British Journal of Musical education.* DOI: http://dx.doi.org/10.1017/s0265051706006887.

Foran, A. (2005). The experience of pedagogic intensity in outdoor education. *Journal of Experiential Education.* 28(2), 147-163.

Forestry Commission Scotland (2009). *Woods for Health Strategy.* Online at: http://www.forestry.gov.uk/pdf/fcfc011.pdf/$FILE/fcfc011.pdf (accessed 26/09/2011)

Frances, B. (2000). *Boys, girls and achievement.* London: Routledge.

Gill, T. (2007). *No fear: growing up in a risk averse society.* London: Calouste Gulbenkian Foundation.

Gill, T. (2010). *Nothing Ventured: Balancing risks and benefits in the outdoors.* England: English Outdoor Council.

Goodyear, P. (2011). Emerging Methodological Challenges for Educaitonal Research. pp. 253-267. In Markauskaite, L., Freebody, P. & Irwin, J. (eds) (2011). *Methodological Choice and Design - Scholarship, Policy and Practice in Social and Educational Research*, Spinger: New York.

Green, J., Liem, G., Martin, A., Colomar, S., Marsh, H., & McInerney, D. (2012). Academic Motivation, self-concept, engagement and performance in high school: Key processes from a longitudinal perspective. *Journal of Adolescence,* 35(5), 1111-1122.

Harris, J. R. (1999). *The nurture assumption: Why children turn out the way they do*. New York: Touchstone.

Harrison, S. (2010). Why are we here? Taking 'place' into account in UK outdoor environmental education. *Journal of Adventure Education and Outdoor Learning,*10(1), 3-18.

Higgins, P. (2002). Outdoor education in Scotland. *Journal of Adventure Education and Outdoor Learning,* 2 (1), 149-158.

Higgins, P. (2010). *Why indoors? The value of outdoor learning.* Paper presented at the Countryside Recreation Network Seminar on Education in the Outdoors. Online at http: www.Countrysiderecreation.org.ukevents/Education_in_the_Outdoors_2010_Proceedings pdf (accessed 14/06/12)

Intergovernmental Conference on Environmenatl Education (1977). *The Tbilisi Declaration.* Online at http:// www.gdrc.org/uem/ee/tbilisi.html (accessed 5/11/2012)

James, J. & Bixler, R. (2008). Children's Role in Meaning Making Through Their Participation in an Environmental Education Program, *The Journal of Environmental Education*, 39(4), 44-59

Kaufeldt, M. (1999). *Begin with the brain: Orchestrating the learner-centered classroom.* Tucson, AZ: Zephyr Press.

Kaplan, S., & Talbot, J. (1983). Psychological benefits of a wilderness experience. In I. Altman, I. & Wolhill, J. (eds) Behaviour and the natural environment. Plenum, New York, pp 163-203.

Kaspar, M. (1999). Achieving standards through environmental education. In L. Mabb (Ed.), *EEducator Special Issue: Advancing Education Reform* (pp. 48-51). NAAEE: Rock Springs, GA.

Kellert, S. (2002). Experiencing nature: affective, cognitive and evaluative development in children. In Kahn, P. and Kellert, S. (Eds.) Children and Nature: Psychological, Sociocultural, and Evolutionary Investigations, The MIT Press, Cambridge, MA, pp 117-151.

Kellert, S. (2005). *Building for Life - Designing and Understanding the human-nature connection,* Island Press, Washington, DC

Kola-Olusanya, A. (2005). Free-choice environmental education: understanding where children learn outside of school. *Environmental Education Research, 11*(3), 297- 307.

Konecki, L., & Schiller, E. (2003). *Brain-based learning and standards-based elementary science* (Report No. SP041386). Washington, DC: Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED472624)

Kozeki, B. & Entwistle, N. (2011). Identifying dimensions of high school motivation in Britain and Hungary. *British Journal of Educational Psychology,* 54(3), 306-319.

Lackney, J. (2008). Teacher Environmental Competence in Elementary school Environments. *Children, Youth and Environment*, 18(2) Online at http://www.colorado.edu/journals/cye (accessed 25/09/12)

Lieberman, G., & Hoody, L. (1998). C*losing the Achievement gap using the environment as an integrating context for learning* (San Diego, CA, State Education and Environmental Roundtable).

Lieberman, G., Hoody, L., & Lieberman, G. (2000). *California student assessment project. The effects of environment- based education on student achievement.* San Diego, CA: State Education and Environment Roundtable.

Lobato, J. (2012). The actor-oriented transfer perspective and its contributions to educational research and practice. *Educational Psychologist,* 47(3), 232-247.

Lohr, V., & Pearson-Mims, C. (2005). Children's active and passive interactions with plants influence their attitudes towards trees and gardening a adults. *Horticultural Technology,* (15), 472-476.

Louv, R. (2008). *Last child in the woods - Saving our children from nature-deficit disorder*. Algonquin Books of Chapel Hill, Chapel Hill, NYC.

Maller, C. (2009). Promoting children's mental, emotional and social health through contact with nature: a model. *Health Education,* 109 (6), 522-543.

Markauskaite, L., Freebody, P., & Irwin, J. (2011). *Bridging and Blending disciplines of inquiry: Doing science and changing policy and practice* (pp 3-17). In Markauskaite, L., Freebody, P & Irwin, J. (Eds.), Methodological Choice and Design - Scholarship, Policy and Practice in Social and Educational Research. Spinger: New York.

Moore, R., & Wong, H. (1997). *Natural Learning - Creating Environemnts for rediscovering nature's way of teaching*. MIG Communications, Berkley, CA.

Munn, P. & Arnott, M. (2009). Citizenship in Scottish Schools: the evolution of education for citizenship from the late twentieth century to the present. *Histoty of Education: Journal of the History of Education Society.* 38(3), 437-454.

Munn, P., Riddell, S., Lloyd, G., Macleod, G., Stead, J., Kane, J. & Fairley, J. (2005). *Evaluation of the Discipline Task Group Recommendations: The deployment of additional staff to promote positive school discipline.* Final Report to the Scottish Executive Education Department. Edinburgh: University of Edinburgh.

The National Environmental Education and Training Foun- dation (NEETF). (2000). *Environment-based education: Creating high performance schools and students*. Washington, DC: NEETF.

Natural England (2011). *Understanding the Benefits of Learning in the Natural Environment.* Report prepared by Kings College London. Online at http://www.naturalengland.org.uk/Images/KCL-LINE-benefits_tcm6-31078.pdf [accessed 5/11/2012]

Nicol, R., & Higgins, P. (1998a). *Perspectives on the philosophy and practice of outdoor education in Scotland*. Paper presented at an international conference, Umea, Sweden August 1998.

Nicol, R., & Higgins, P. (1998b). *A sense of place: a context for environmental outdoor education.* In P. Higgins and B. Humberstone (Eds). Celebrating diversity: learning by sharing cultural differences, (pp50-55). Buckinghamshire: European Institute for Outdoor Adventure Education and Experiential Learning.

Nilsson, K., Sangster, M., Gallis, C., Hatig, T., de Vries, S., Seeland, K., & Schipperijin,T. (Eds) (2011). *Forests, Trees and Human Health*. New York: Springer.

Nundy, S (1999). The fieldwork effect: the role and impact of fieldwork in the Upper Primary School. *International Research in Geographical and Environmental Education*, 8, 190-198.

Nundy, S. (2001). *Raising achievement through the environment: a case for fieldwork and field centres*. National Association of Field Studies Officers, Peterborough, UK.

O'Brien, L. *et al.* (2011). Outdoor Education, Life Long Learning and Skills Development in Woodlands and Greenspaces: The Potential Links to Health and Well-Being (pp 343-374). In: Nilsson, K., Sangster, M., Gallis, C., Hatig, T., de Vries, S., Seeland, K., & Schipperijin,T. (Eds) *Forests, Trees and Human Health*. New York: Springer,

Orion, N. (1993). A model for the development and implementation of field trips as an integral part of the curriculum - *School Science and Mathematics,* 93 (6), 325-331.

Orr, D. (2004). *Earth in Mind; On education, environment and the human prospect*. Island Press, London.

Palmer, J., & Suggate, J. (1996) Influences and experiences affecting the pro-environmental behaviour of educators. *Environmental Education Research*, *2* (1), 109-121.

Piaget, J. (1952). *The origins of intelligence in children*. International Universities Press, New York.

Powell, S. & Tod, J. (2004). *A Systematic Review Of How Theories Explain Learning Behaviour in School Contexts* [online]. Online at: http://eppi.ioe.ac.uk/EPPIWebContent/reel/review_groups/TTA/BM(CCC)/BM(CCC)_2004review.pdf (accessed 14/09/2012)

Pyle, R. (2002). Eden in a vacant lot: special places, species and kids in the neighbourhood of life. In Kahn, P. and Kellert, S. (Eds.) *Children and Nature: Psychological, Sociocultural, and Evolutionary Investigations,* The MIT Press, Cambridge, MA.

Randall, J. (2001). *Enhancing high school writing skills with florida biodiversity education*. Unpublished PhD. University of Florida.

Ramsey, J.M., Hungerford, H.R. & Volk, T.L. (1992). Environmental education in the K-12 curriculum: Finding a niche. *Journal of Environmental Education 23*(2), 35-45.

Rassmussen, K. (2000). Environmental education evolves: developing citizens, furthering education reform. *Association for Supervision and Curriculum Development, 42*(1).

Rickinson, M. (2001). Learners and learning in environmental education: a critical review of the evidence, *Environmental Education Research,* 7(3), 207-320.

Rickinson, M. (2005). *Practicioners' use of research.* NERF working paper 7.5. London: National Educational Research Forum.

Rivkin, M. (1995). *The great outdoors - restoring children's right to play ouside*. National Association for the Education of Young Children, Washington, DC.

Rivkin, M. (1997). The schoolyard habitat movement; what it is and why childreen need it. *Early Childhood Education Journal*, 25 (1), 61-66.

Robinson, C. & Kakela, P. (2006). Creating a Space to Learn: A classroom of fun, interaction, and trust, *College Teaching,* 54(1), 202-207.

Scottish Government (2007). Promoting Resilience -why it matters? *Well? (*10) Online at: http:// www.scotland.gov.uk/Publications/2007/06/12153044/4 (accessed 19/09/2012).

Slavin, R. (2008). What works? Issues in synthesising educational program evalautiaons. *Educational Researcher,* 37(1), 5-14.

Stern, M., Powell, R., & Ardoin, N. (2010). Evaluating a constructivist and culturally responsive apparoch to environemntal education for diverse audiences. *Journal of Environmental Education,* 42 (2), 9-22.

Sustainable Development Commission (2008). *Health, place and nature: how outdoor environments influence health and well-being: a knowledge base.* Online at: http://www.sd-commission.org.uk/ publications/downloads/Outdoor_environments_and_health.pdf (accessed 14/02/09)

Tanner, K. (2000). The influence of school architecture on academic achievement. *Journal of Educational Administration*, 38(4), 309-330.

Tanner, K. (2001). Into the woods, wetlands, and prairies. *Educational Leadership*, 58 (7), 64-66.

Tanner, K. (2006). Effects of the school's physical environment on student achievement. *Educational Planning*, 15(2), 25-44.

Tanner, K. (2008). Explaining relationships among student outcomes and the school's physical environment. *Journal of Advanced Academics,* 19(3), 444-471.

Tanner, K. (2009). Effects of school design on student outcomes. *Journal of Educational Administration,* 47 (3), 381-399.

Tanner, K., & Lackney, J. (2006). *Educational facilities planning: Leadership, architecture, and management.* Boston, MA: Pearson.

Taylor, D., & Lorimer, M. (2003). Helping boys succeed. *Educational Leadership,* 60(4), 68–70.

The National Environmental Education and Training Foundation (NEETF). (2000). *Environment-based education: Creating high performance schools and students*. Washington, DC: NEETF.

Vergou, A. (2010). An Exploration of Botanic Garden – School Collaborations and Student Environmental Learning Experiences. Unpublished PhD Thesis. University of Bath.

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press.

Weibel, M. (2011).,*Being outside learning about science is amazing: A mixed methods study.* UNLV Theses/ Dissertations/ Professional Papers/Capstones. Paper 1272.Online at: http://digitalscholarship.unlv.edu/thesesdissertations/1272 (accessed 15/09/2012)

Wells, N., & Evans, G. (2003). Nearby nature: A buffer of life stress among rural children. *Environment and Behavior*, 35(3), 311-330.

Wells, N., & Lekies, K. (2006). Nature and the Life Course: Pathways from childhood nature experiences to adult environmentalism. *Children, Youth, and Environment*, 16(1), 1-24.

White, J. (1998). An tir, an canan, 'sna daoine (the land, the language, the people): Outdoor education and an indigenous culture. In P. Higgins, & B. Humberstone (Eds.), *Celebrating diversity: Learning by sharing cultural differences*. Buckinghamshire: European Institute for Outdoor Adventure Education and Experiential Learning.

White, R. (2010). *Building Schools of Character: The Development, Implementation, and Evaluation of a School-Based Character Education Programme Designed to Promote Cooperative Learning and Reduce Anti-Social Behaviour,* Durham theses, Durham University. Available at Durham E-Theses Online: http://etheses.dur.ac.uk/189/

White, R., & Stoecklin, V. (1998). *Children's outdoor play and learning environments: Returning to nature*. Online at: www.whitehutchinson.com/children/articles/outdoor.shtml (accessed 15/09/2012).

White, R., & Warfa, N. (2011). Building Schools of Character: A case-study investigation of character education's impact on school climate, pupil behaviour, and curriculum delivery. *Journal of Applied Psychology,* 41(1), 45-60.

Wightman, A. (1996). *Who owns Scotland?* Edinburgh: Canaongate Press.

Williams, R. (2012). *The impact of residential adventure education on primary school pupils.* Unpublished PhD. University of Exteter.

Wurdinger, S. (2005). *Using experiential learning in the classroom: practical ideas for all educators*. Lanham, MD: The Scarecrow Press, Inc.

Younger, M., Warrington, M., & Williams, J. (1999). The gender gap and classroom interactions; Reality and rhetoric. *British Journal of Sociology Education*, 20, 325-41.